

CLAIMS

What is claimed is:

1.

A two-axis robot for transferring a specimen container from a first reference location on a first conveyor to a second reference location spaced from the first conveyor, comprising:

a frame for supporting the robot;

a vertically oriented post having a vertical rotational axis, said post mounted for selective rotation on said frame;

a first motor mounted on the frame, connected to the post for selectively rotating the post in first and second directions on the rotational axis;

said frame connected to said first conveyor to maintain the first conveyor at a predetermined distance relative to the post rotational axis;

a queue on said first conveyor, for selectively retaining a specimen container on the first conveyor in a first reference location;

a second reference location spaced from the first conveyor, for receiving a specimen container from the first reference location, said frame connected to the second reference location to maintain the second reference location at a predetermined distance from the post rotational axis;

said first and second reference locations spaced an equal distance from the post rotational axis;

a vertical shaft slidably mounted on said post for selective vertical movement;

a second motor on said frame, connected to the shaft for selectively raising and lowering the shaft on said post;

an arm mounted on an upper end of said shaft and extending radially outwardly from the shaft to an outer end located at a distance to extend over the first and second reference locations;

a gripper assembly mounted on the outer end of the arm, with a pair of operable jaws depending therefrom;

said jaws oriented generally vertically and parallel one another, and operable between an open position with both jaws spaced equidistant outwardly from a vertical central axis, and a closed position in gripping engagement on opposite sides of a specimen container;

said first and second reference locations located along a circle circumscribed by the vertical central axis of the gripper assembly jaws as the arm is rotated on the post rotational axis; and

a command and control module with a processor electrically connected to the first and second motors and the queue, for controlling the operation of the robot to move a specimen container between the first and second reference locations.

2.

The two-axis robot of claim 1, wherein said specimen container is a generally cylindrical specimen tube.

3.

The two-axis robot of claim 2, wherein said first reference location is a first vertical aperture in the top of a generally rectangular specimen carrier, the specimen carrier having a horizontal longitudinal centerline with a central axis of the aperture located along the centerline.

4.

The two-axis robot of claim 3, wherein said first conveyor is oriented such that the specimen carrier centerline is perpendicular to a radial from the post rotational axis.

5.

The two-axis robot of claim 4, wherein said specimen carrier includes a plurality of apertures formed in the top, each of the apertures having a vertical axis located along the carrier centerline, and wherein said first aperture is generally center among the plurality of apertures.

6.

The two-axis robot of claim 5, wherein said plurality of apertures in the specimen carrier includes a forward-most aperture and a rearward-most aperture, said forward-most and rearward-most aperture vertical axes spaced equidistant and at a predetermined distance from the vertical axis of the first aperture.

7.

The two-axis robot of claim 6, wherein said first and second reference locations are spaced a distance from the post rotational axis such that the vertical axes of the forward-most and rearward-most apertures are no more than .007 inches from the circle circumscribed by the gripper jaws central vertical axis as it rotates about the post rotational axis.

8.

The two-axis robot of claim 7, wherein said second reference location is a first vertical aperture in the top of a generally rectangular specimen carrier, the specimen carrier carried on a second conveyor and having a horizontal longitudinal centerline with a central axis of the aperture located along the centerline.

9.

The two-axis robot of claim 8, wherein said second conveyor is oriented such that the centerline of the specimen carrier thereon is perpendicular to a radial from the post rotational axis.

10.

The two-axis robot of claim 9, wherein said specimen carrier on the second conveyor includes a plurality of apertures formed in the top, each of the apertures having a vertical axis located along the carrier centerline, and wherein said first aperture is generally center among the plurality of apertures.

11.

The two-axis robot of claim 10, wherein said queue includes a retractable shaft operable between an extended position projecting across the first conveyor to stop a specimen carrier thereon, and a retracted position clear of the first conveyor to permit movement of the carrier thereby on the first conveyor.

12.

The two-axis robot of claim 11, wherein said queue includes a motor for selectively extending and retracting the retractable shaft, said motor electrically connected to the command and control processor and responsive to instruction therefrom to extend and retract the retractable shaft.

13.

The two-axis robot of claim 12, wherein said queue further includes a sensor adjacent the retractable shaft to detect the presence of a specimen carrier at said retractable shaft, said sensor electronically connected to the command module processor for transmitting detection information thereto.

14.

The two-axis robot of claim 13, wherein said queue further includes a scanner in said housing oriented to scan a specimen carrier restrained by the retractable shaft, to collect identification data therefrom, said scanner electrically connected to the command module and adapted to transmit identification data to the command module.

15.

The two-axis robot of claim 14, wherein said second reference location further includes a scanner oriented to scan a specimen carrier at the second reference location, to collect identification data therefrom, said scanner electrically connected to the command module processor and adapted to transmit identification data to the command module.